

## REMARKS

The foregoing amendment does not include the introduction of new matter into the present application for invention. Therefore, the Applicants, respectfully, request that the above amendment be entered in and that the claims to the present application be, kindly, reconsidered.

The Office Action dated April 24, 2003 has been received and considered by the Applicants. Claims 1 through 20 are pending in the present application for invention. Claims 1 through 20 stand rejected by the April 24, 2003 Office Action. The first page of the Office Action indicates that claims 1 through 20 are also objected to, however, there is no objection to these claims contained within the Office Action.

The Office Action rejects claims 1 through 20 are rejected under the provisions of 35 U.S.C. §103 (a) as being obvious over U.S. Patent No. 6,456,737 issued in the name of Woodfill et al. (Woodfill et al.) in view of U.S. Patent No. 5,850,352 issued in the name of Moezzi et al. (Moezzi et al.).

Regarding claim 1, the Examiner states that Woodfill et al. teaches the camera may be or may not be in motion and the analysis therein involves comparing successive frames. The Examiner further states that Woodfill et al. does not specify the alignment based and distance between one or more points in the first image and the second image, however, Moezzi et al. teaches that all supporting observations or use appropriate weighting based on distance from the camera as well as correction of motion to update the position of each object. The Examiner further states that the "second alignment based on distances is obvious because the process will continue for each frame." The Applicant would like to, respectfully, point out that rejected claim 1 to the present invention specifically recites a determination of a first alignment approximation based on distances between one or more points in the first image in the second image, aligning the second image to the first image based on the first alignment approximation, followed by a second determination of a second alignment approximation based on points in the first image and the points in the initially aligned second image followed by a second alignment based on the first and second alignment approximations. The Examiner in making the rejection to claim 1 of the present invention has failed to give credence to each of the recited elements.

The MPEP at §2143.03 discusses the requirement that all claim limitations must be taught or suggested. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180

USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The rejection to claim 1 contained in the Office Action discusses camera motion, the identification of the images by their space/time attributes, comparing successive frames, alignment based on distance between two more points in the first image and the second image and computations involving arithmetical manipulations of the calculated arrays of image data. The Applicant would like to, respectfully, point out that the rejection to claim 1 contained within the Office Action does not address all the elements recited by claim 1. By not addressing all the elements within rejected claim 1, the Office Action has taken the recited elements to rejected claim 1 and attempted to apply the cited prior art references to the individual elements of rejected claim 1 out of context. The Examiner is required to look at rejected claim 1 in its entirety, and not in individual pieces. The elements to rejected claim 1 specifically recite determining a first alignment approximation, aligning the second image to the first image based on the first alignment approximation, determining a second alignment approximation, and aligning the second image to first image based on a combination of the first and second alignment approximations. It is this iterative process of successive alignments that provides the present invention with advantages over the prior art. The Office Action has completely ignored the limitations of rejected claim 1 resulting in a failure to establish a case of *prima facie* obviousness of a claimed invention.

In an effort to complete the rejection the Examiner has simply attempted to insert elements that are not found in the sided prior art references. For example, the step of the second alignment recited by rejected claim 1 to present invention, is not found in the sided references, therefore, the Examiner completes the rejection by making the cursory statement that "the step of second alignment based on distances is obvious because the process will continue for each frame." The Applicant would like to, respectfully, point out that the second alignment uses points in the first image and the initially aligned second image. In order to sustain rejection based on obviousness, the Examiner must show where the elements exists within the recited prior art references, and Examiner has failed to give any indication where all the elements to rejected claim 1 of the present invention exist within the cited references. In making the rejection to

claim 1, the Office Action discusses features within the prior art that relate to the movement of cameras, as well as discussing computations for calculated arrays and image data, but has failed to address the elements as recited by the rejected claim 1 to the present invention. There is no disclosure, or suggestion, with undecided references for the successive iterations that are recited by the elements to rejected claim 1 wherein the initial alignment is based on points within two images and a subsequent alignment based on points within the previous alignment and one of the images. The Applicants would like to, respectfully, point out that this iterative process of making successive alignments are fundamental to the present invention. The Applicant would like to, respectfully, draw the Examiner's attention to page 9 of the specification to the present invention, beginning on line 4, where it is specifically discussed that the two-stage estimation process of the invention provides inherently more accurate estimates for image alignment parameters.

Furthermore, the advantage of the present invention is more pronounced when there are large movements in the camera. The Examiner has failed to indicate where within any of the recited prior art references, a two-stage estimation process is employed, other than simply making the cursory statement that "it would be obvious". Not only has the Office Action failed to show multiple stage alignment processes, the Office Action is completely devoid of even mentioning the attributes defined by the elements of rejected claim 1 regarding the second alignment being based on the results of the first alignment and one of the images. The Examiner is not allowed to ignore claim limitations. The Office Action has completely ignored the specific limitations recited by the elements to rejected claim 1. Accordingly, the rejection to claim 1 is, respectfully, traversed. However, in an effort to move this case towards allowance, claim 1 has been amended to more clearly define that which the Applicant considers to be the invention. Claim 1 has been amended to clearly identify that there is a difference in image resolution for the image used by the first and second alignments. The Applicants, respectfully, submit that this change to claim 1 prevents any reasonable reading of the cited references on the amended version of claim 1 to the present invention.

Regarding rejected claim 2 of the present invention, which recites the "aligning the initially aligned second image, which is based on the first alignment approximation, the first image, based on the second alignment approximation," the Examiner again states that the features disclosed within cited prior art references, Woodfill et al., that the camera can be in motion and that distinct images can you be identified by their space/time attributes including the

comparing of successive frames. However, this rejection contained within the Office Action does not address the recited elements of rejected claim 2 of the present invention. Rejected claim 2 specifically details that the second image is based on the first alignment approximation is aligned to the first image based on the second alignment approximation. Nowhere within the Office Action are the recited features of rejected claim 2 for the present invention addressed. Accordingly, this rejection is, respectfully, traversed.

Regarding claim 3, the Examiner specifically states that Woodfill et al., does not specify high-resolution representation of image is but that Moezzi et al. employees world coordinate, bounding box object representations. The applicant, would like to respectfully, point out that rejected claim 3 to present invention specifically recites the first alignment being based on a low resolution representation of the first and second images while the second alignments is based on high representation of the first and second images. Nowhere within the Office Action are the recited elements to rejected claim 3 of the present invention addressed. Even in viewing the cited prior art references, Woodfill et al. and Moezzi et al., in a very broad sense do these references disclose, or suggest, the recited elements of rejected claim 3 to present invention wherein a first alignment of two images is accomplished a low resolution followed by a second alignment accomplished at a higher -resolution based on the first alignment and one of the images. Accordingly, this rejection is respectfully traversed.

Regarding claim 4, which depends claim 1 that as previously discussed is believed to be global over the cited references, claim 4 further narrows and defines claim 1, therefore, claim 4 is also believed to be allowable. This is especially true in view of the amendment made to claim 1, which clearly recites that the first and second alignment are accomplished at different resolutions. Therefore, claim 4 is believed to be allowable over the cited references.

Regarding claimed 5, "determining the first alignment approximation includes an approximation of the least one of a rotation component and a translation component in image space of the first and second images," the Rejection Contained in the Office Action addresses the fact that Woodfill et al. does not specify high-resolution images, but that Moezzi et al. employees world coordinates and bounding box object representations. The Applicant would like to, respectfully, point out that the rejection contained within the Office Action does not address the elements to rejected claim five of the present invention. Accordingly, this rejection is respectfully, traversed.

Regarding claim 6 which depends claim five that as previously discussed is believed to be global over the cited references, claim 6 further narrows and defines claim by, therefore, claim 6 is also believed to be allowable. This is especially true in view of the amendment made to claim 5, which clearly recites the first and second alignments are accomplished at different resolutions. Therefore, claim 6 is believed to be allowable over the cited references.

Regarding claim 7 which depends claim 1 that as previously discussed is believed to be global over the cited references, claim 7 further narrows and defines claim 1, therefore, claim 7 is also believed to be allowable. This is especially true in view of the amendment made to claim 1, which clearly recites the first and second alignments are accomplished at different resolutions. Therefore, claim 6 is believed to be allowable over the cited references.

Regarding rejected claim 8 to the present invention, the wording specifically recites "determining at least one of the first and second alignment approximations based on a determination of Minimum Intensity Changes at the Corners." The rejection contained within the Office Action states that the step recited by rejected claim 8 to the present invention is obvious "because the comparison of different frame of images will provide alignment approximation to identify corners." The Applicant would like to, respectfully, point out that the rejection to claim 8 of the present invention contained within the Office Action does not address the recited elements. Rejected claim 8 to present invention not only recites identify corners in the first second images, rejected claim 8 to the present invention specifically recites that the identification of corners in the first and second images is based upon a determination of Minimum Intensity Changes at the Corners. This claim limitation has been completely ignored by the rejection contained within the Office Action. Accordingly, this rejection is, respectfully, traversed.

Regarding the rejection of claim 9 to the present invention of contained in the Office Action, the Examiner again discusses that the cited prior art reference, Woodfill et al., teaches that the camera may be in motion, that the identification of the images is accomplished by their space/time attributes, comparing successive frames, alignment based on distance between two more points in the first image and the second image and computations involving arithmetical manipulations of the calculated arrays of image data. The Applicant would like to, respectfully, point out that the rejection to claim 9 contained within the Office Action does not address all the elements recited by claim 9. By not addressing all the elements within rejected claim 9, the

Office Action has taken the recited elements to rejected claim 9 and attempted to apply the cited prior art references to the individual elements of rejected claim 9 out of context. The Examiner is required to look at rejected claim 9 in its entirety, and not in individual pieces. The elements to rejected claim 9 specifically recite determining a first alignment approximation, aligning the second image to the first image based on the first alignment approximation, determining a second alignment approximation, and aligning the second image to first image based on a combination of the first and second alignment approximations. It is this iterative process of successive alignments that provides the present invention with advantages over the prior art. The Office Action has completely ignored the limitations of rejected claim 9 resulting in a failure to establish a case of *prima facie* obviousness of a claimed invention. The Examiner has failed to indicate where within the cited references the recited feature of the second alignment being based upon the first image and the initially lined second image is taught. Accordingly, this rejection is, respectfully, traversed. However, in an effort to move this case towards allowance, claim 9 to present invention has been amended in a manner similar to that for claim 1 previously discussed to clearly identified that the first and second alignments are done at different resolutions. The Applicant, respectfully, submits that even a very broad reading of the cited references cannot be read upon claim 9, and that this is especially true after the amendment.

Regarding rejected claim 10 to present invention the Examiner specifically states that Woodfill et al., does not specify high-resolution representation of image is but that Moezzi et al. employees world coordinate, bounding box object representations. The applicant, would like to respectfully, point out that rejected claim 10 to present invention specifically recites the first alignment being based on a low resolution representation of the first and second images while the second alignments is based on high representation of the first and second images. Nowhere within the Office Action are the recited elements to rejected claim 10 of the present invention addressed. Even in viewing the cited prior art references, Woodfill et al. and Moezzi et al., in a very broad sense 2 these references disclose, or suggest, the recited elements of rejected claim 10 to present invention wherein a first alignment of two images is accomplished a low resolution followed by a second alignment accomplished at a higher -resolution based on the first alignment and one of the images. Accordingly, this rejection is respectfully traversed.

Regarding claim 11, the Examiner again states that the features disclosed within cited prior art references, Woodfill et al., that the camera can be in motion and that distinct images can

be identified by their space/time attributes including the comparing of successive frames. However, this rejection contained within the Office Action does not address the recited elements of rejected claim 11 of the present invention. Rejected claim 11 specifically details that the second image is based on the first alignment approximation is aligned to the first image based on the second alignment approximation. Nowhere within the Office Action are the recited features of rejected claim 11 for the present invention addressed. Accordingly, this rejection is, respectfully, traversed.

Regarding claim 12, claim 12 depends from claim 9 which has previously discussed is believed to being allowable over the cited references, therefore since claim 12 further limits and defines claim 9, claim 12 is also believed to be allowable.

Regarding claim 13, the Examiner again discusses that the cited prior art reference, Woodfill et al., teaches that the camera may be in motion, that the identification of the images is accomplished by their space/time attributes, comparing successive frames, alignment based on distance between two more points in the first image and the second image and computations involving arithmetical manipulations of the calculated arrays of image data. The Applicant would like to, respectfully, point out that the rejection to claim 13 contained within the Office Action does not address all the elements recited by claim 13. By not addressing all the elements within rejected claim 13, the Office Action has taken the recited elements to rejected claim 13 and attempted to apply the cited prior art references to the individual elements of rejected claim 13 out of context. The Examiner is required to look at rejected claim 13 in its entirety, and not in individual pieces. The elements to rejected claim 13 in addition to contain steps of independent claims 1 and 9, ejector claim 13 specifically recites comparing the sets aligned images to determine motion. Claim 13 performs a first alignment based on two images and then determines the second alignment based on the first alignments and one of the images. These two discrete alignments are then used in a comparison phase to determine motion. The Office Action has completely ignored the limitations of rejected claim 13 resulting in a failure to establish a case of *prima facie* obviousness of a claimed invention. The Applicant, respectfully, submits that even a very broad reading of the cited references cannot be read upon claim 13. Accordingly, this rejection is, respectfully, traversed.

Regarding claim 14, the Examiner again states that Woodfill et al. does not specify high-resolution representation of images but that Moezzi et al. employees world coordinate, bounding

box object representations. The Applicant, would like to respectfully, point out that rejected claim 14 to present invention specifically recites the first alignment being based on a low resolution representation of the first and second images while the second alignments is based on high representation of the first and second images. Nowhere within the Office Action are the recited elements to rejected claim 14 of the present invention addressed. Accordingly, this rejection is respectfully traversed.

Regarding claim 15, which depends from claim 13 in further narrows and defines claim 13, since claim 13 is believed the allowable claim 15 is also believed to be allowable over the cited references.

Regarding claim 16, the Examiner states that Woodfill et al. teaches a parallel pipeline computing system designed to perform data such comparisons efficiently and low costs with data being processed in a systolic nature through pipeline. However, the Applicant would like to, respectfully, point out that rejected claim 16 to present invention recites a memory for storing the representation of a target image and a processor being configured to identify a target within the set aligned images based on the representation of the target image. Therefore, the Applicant respectfully submits that the recited features of rejected claim 16 to the present invention are not addressed by the Office Action. Accordingly, this rejection is, respectfully, traversed.

Regarding rejected claim 17 to present invention, claim 17 depends claim 16 and further includes the representation of the target image as based on color content of the target image. The rejection contained within the office action does not invention color content, but instead reiterates the same rejection that was used on numerous of the previously discussed claims. The rejection to claim 17 contained within the Office Action does not address color content. Therefore this rejection is respectfully traversed.

Regarding the rejection to claim 18 contained within the Office Action, claim 18 recites the determining of location object in each image of the set aligned images and determining a movement of the object by comparing location of the object in each image. The rejection to claim 18 contained within the Office Action, reiterates the same verbiage that was used to rejected numerous of the previously discussed claims without addressing the recited features to rejected claim 18. The Examiner again discusses that the cited prior art reference, Woodfill et al., teaches that the camera may be in motion, that the identification of the images is accomplished by their space/time attributes, comparing successive frames, alignment based on distance



between two more points in the first image and the second image and computations involving arithmetical manipulations of the calculated arrays of image data. The Applicant would like to, respectfully, point out that the rejection to claim 18 contained within the Office Action does not at all address the elements recited by claim 18. Accordingly, this rejection is respectfully traversed.

Regarding claim 19, the Examiner again discusses that the cited prior art reference, Woodfill et al., teaches that the camera may be in motion, that the identification of the images is accomplished by their space/time attributes, comparing successive frames, alignment based on distance between two more points in the first image and the second image and computations involving arithmetical manipulations of the calculated arrays of image data. However, claim 19 specifically recites determine the first alignment approximation includes at least one of a rotation component and a translation component. The cited elements within claim 19 are not even mentioned in the rejection contained within the Office Action. Accordingly this rejection is respectfully traversed.

Regarding claim 20, which depends correctly from claim 19 and indirectly from claim 13 and further narrows and defines these claims, which as previously discussed are believed to be allowable, claim 20 is also believed to be allowable.

In view of the foregoing amendment and remarks, the Applicants believe that the present application is in condition for allowance, with such allowance being, respectfully, requested.

Respectfully submitted,

By 

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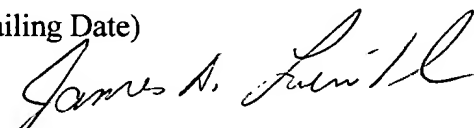
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